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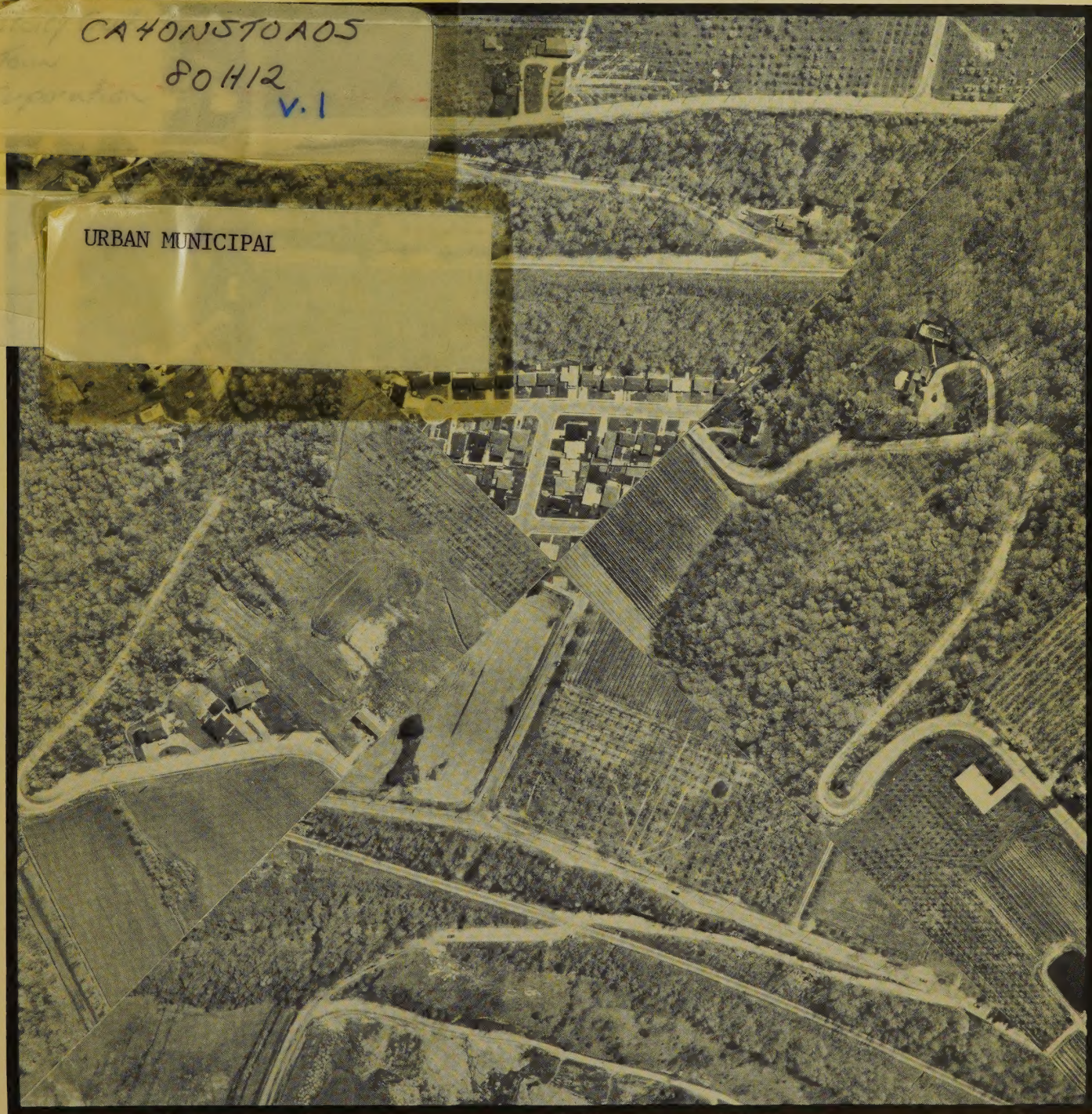
ESCARPMENT ACCESSIBILITY STUDY

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TOWN OF STONEY CREEK

MCCORMICK RANKIN

HAMILTON - WENTWORTH



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SUMMARY REPORT

TOWN OF STONEY CREEK

MCCORMICK RANKIN

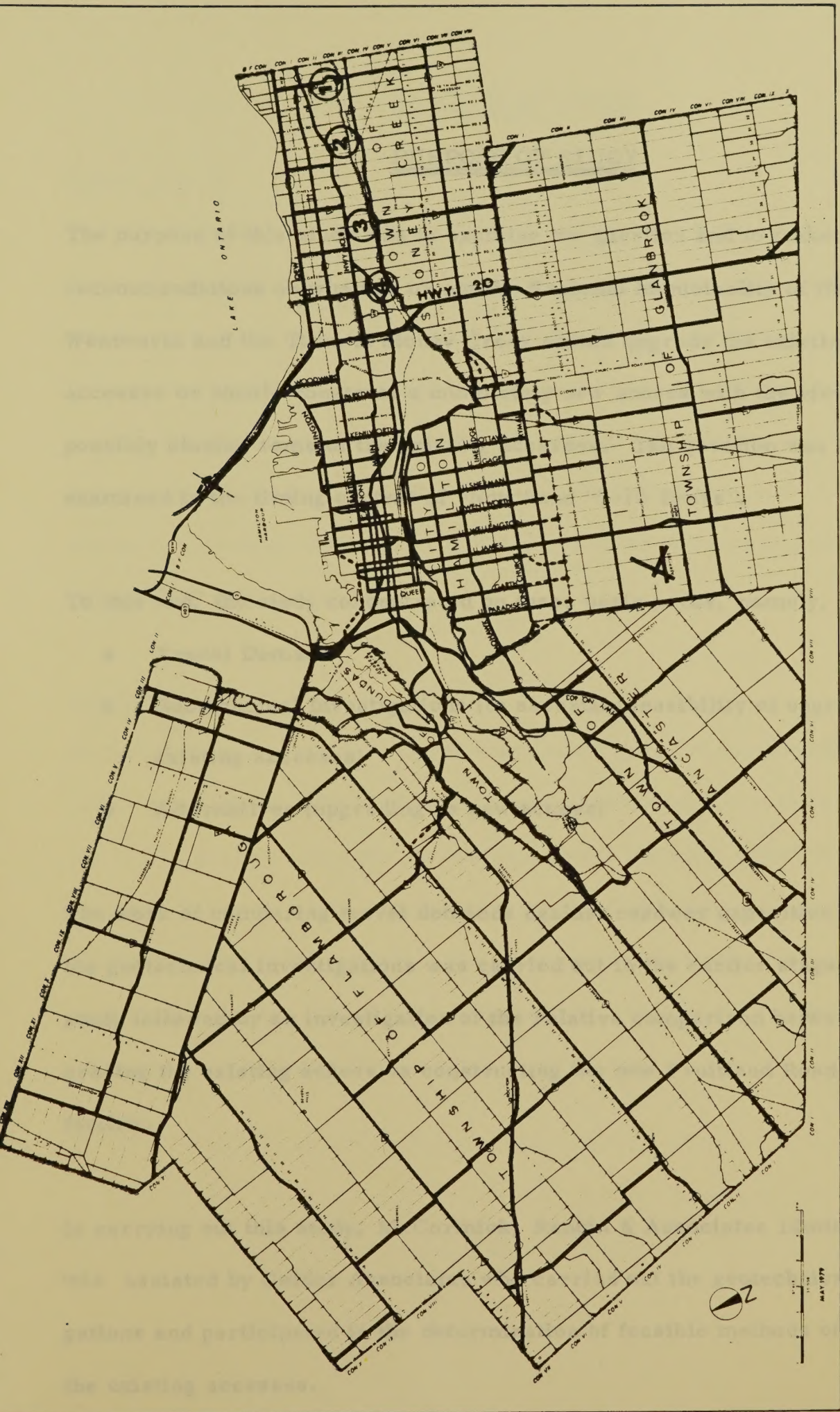
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BACKGROUND

East of Highway 20 in the Town of Stoney Creek, there are currently four escarpment access roadways; Fifty Road, McNeilly Road, De Witt Road and New Mountain Road. Each of these roadways is in generally poor condition. Over the years these roadways have come to the point where they no longer meet lane width, grade, and vertical and horizontal sight distance requirements. These roadways also have very high on-going maintenance costs, even to maintain them passable. All four accesses were constructed on side hill talus cuts and fills resulting in unstable foundation conditions.

The former County of Wentworth, the Town of Stoney Creek and more recently the Regional Municipality of Hamilton-Wentworth have looked at establishing a new Escarpment Access Road connecting Fruitland Road in the lower Town to Tapleytown Road above the escarpment. This project has not proceeded as a result of insufficient travel demands and high implementation costs. Official Plan amendments are, however, now proceeding and if implemented will permit development in the vicinity of the previously identified Fruitland Road Escarpment Access alignment.



LEGEND

EXISTING PROPOSED

INTER-REGIONAL HIGHWAY

ARTERIAL

① FIFTY ROAD (REG. RD. 50)

② MCNEILLY ROAD

③ DEWITT ROAD

④ NEW MOUNTAIN ROAD (REG. RD. 25)

TRANSPORTATION

Planning & Development Department
Hamilton - Wentworth Region

PURPOSE OF STUDY

The purpose of this study was to examine the question and to make recommendations on whether or not the Regional Municipality of Hamilton-Wentworth and the Town of Stoney Creek should upgrade the existing accesses or should construct a completely new access with the view to possibly closing some of the existing accesses. The question was to be examined in the timing context of "Now" and "5-10 Years".

To this end, the study concentrated on three basic areas, namely,

- Travel Demand
- Geotechnical Investigations (to ascertain feasibility of upgrading existing accesses)
- Alternatives (upgrading vs new access)

The work of comparing travel demands against roadway capacities as well as the geotechnical investigations was carried out in the earlier stages of the study followed by an investigation of the relative comparison between upgrading the existing access vs constructing the new Fruitland Road access facility.

In carrying out this study, McCormick, Rankin & Associates Limited was assisted by Golder Associates who carried out the geotechnical investigations and participated in the determination of feasible methods of upgrading the existing accesses.

EXISTING ACCESSES

FIFTY ROAD

Fifty Road in the Town of Stoney Creek is a two lane north-south Regional Road extending from Mud Street (Regional Road 11) above the escarpment northerly to an interchange with the QEW below the escarpment. The escarpment section of the road is quite steep (up to 15% grades) and fairly narrow (8.7 metre platform width) with 7 substandard horizontal curves between Ridge Road and Highway 8, a distance of approximately 2.3 kilometers. The most recent road appraisal rated the escarpment section (No. 45020) at 51 out of 100.

McNEILLY ROAD

McNeilly Road is a two lane north-south roadway under the jurisdiction of the Town of Stoney Creek. The escarpment section of the road is very steep (up to 20% grades) and quite narrow (8.2 metre platform width) with 2 substandard horizontal curves between Ridge Road and Highway 8, a distance of approximately 1.8 kilometers. The most recent road appraisal rated the escarpment section (No. 094) at 58 out of 100. Safe speed and structural adequacy were rated as being critically deficient.

DE WITT ROAD

DeWitt Road is a north-south roadway extending from Ridge Road northerly to Lake Ontario and under the jurisdiction of the Town of Stoney Creek.

The escarpment section of the road is very steep (up to 20% grades) and very narrow (4.9 metre platform width) consequently traffic flow is restricted to one lane southbound. There are 2 substandard horizontal curves between Ridge Road and Highway 8 a distance of approximately 1.6 kilometers.

This roadway crosses the Welland Subdivision line of the Toronto, Hamilton & Buffalo Railway at grade in the vicinity of the base of the limestone strata which forms to top of the Niagara Escarpment. The existing daily rail traffic consists of 8 to 10 trains per day.

The most recent road appraisal rated the escarpment section (No. 112) at 38 out of 100 with surface width, safe speed and structural adequacy being critically deficient.

NEW MOUNTAIN ROAD

New Mountain Road in the Town of Stoney Creek is a two lane north-south Regional Road extending from Ridge Road northerly to King Street. The escarpment section of the road is quite steep (up to 13.5% grades) and fairly narrow (8.5 metre platform width) with 1 substandard horizontal curve between Ridge Road and King Street, a distance of approximately 1.2 kilometers. This roadway underpasses the Welland Subdivision line of the

Toronto, Hamilton & Buffalo Railway immediately south of Leslie Drive.

Vertical clearance at the grade separation is limited to 3-5 metres. The most recent road appraisal rated the escarpment section (No. 42510) at 57 out of 100.

TRAVEL DEMAND

TRAFFIC VOLUMES

Previous traffic counts on McPhail Road and DeWitt Road dated back to 1975 and on Fifty Road and New Mountain Road to 1978, consequently the Region arranged for subsequent periodic traffic counts (May 1980) for each of the four sections of the corridor at the completion of the improvement. This information is summarized as follows:

SUMMARY OF TRAFFIC VOLUMES

1975 - 1980

	1975	1978	1980	%
	AADT	AADT	AADT	Change
Access Road				
Fifty Road		936	988	Unchanged
McPhail Road	571		824	+ 43%
DeWitt Road	1085(1)		825(2)	+ 33%
New Mountain Road		1590	2948	+159%

(1) two directions of traffic

(2) southbound only

TRAVEL DEMAND

TRAVEL DEMAND

TRAFFIC VOLUMES

Previous traffic counts on McNeilly Road and DeWitt Road dated back to 1975 and on Fifty Road and New Mountain Road to 1978, consequently the Region arranged for and subsequently supplied directional traffic counts (May 1980) for each of the four accesses at the crossing of the escarpment. This information is summarized as follows:

SUMMARY OF TRAFFIC VOLUMES

1975 - 1980

Access Road	1975 AADT	1978 AADT	1980 AADT	% Change
Fifty Road		930	900	Constant
McNeilly Road	575		835	+ 45%
DeWitt Road	1025(1)		825(2)	+ 65%
New Mountain Road		1590	3940	+150%

(1) two directions of traffic

(2) southbound only

ACCIDENT DATA

In addition to collecting data on traffic volumes on each of the four accesses, traffic accident data over a three year period between January 1, 1977 and December 31, 1979 was collected and subsequently analysed.

Over the three year period, there were a total of 48 accidents on the four accesses between Highway 8 and Ridge Road. The following summarizes the accident data by access road.

TABLE I

SUMMARY OF ACCIDENT DATA

(January 1, 1977 to December 31, 1979)

Access Road	Total Number Of Accidents	Total Number Of Personal Injuries
Fifty Road	12	7
McNeilly Road	9	1
DeWitt Road	2	0
New Mountain Road	25	12
Totals	48	20

The number of accidents are roughly proportional to the vehicle kilometers travelled on each roadway over the three year period with the exception of DeWitt Road, which because of the extremely poor service condition, has experienced fewer accidents as a result presumably of driver caution.

In addition, approximately one half of the total reported accidents occurred on wet or snow covered pavement and two thirds were located on the 'hill', sections characterized by steep grades.

It can be concluded from a review of this information that the roadway geometry on each of the accesses is so deficient as to beneficially influence the driving habits of the average motorist.

POPULATION & EMPLOYMENT FORECASTS

Population and employment projections for the year 2001 have been developed by the Region of Hamilton-Wentworth, in consultation with the area municipalities and are summarized on Table 2. The Region is expected to grow an average growth rate of 1.2% to a population of 550,000 by the year 2001.

Employment is expected to increase to a level of 290,000 jobs over the same period. Corresponding projections for the Town of Stoney Creek are as follows:

TABLE 2

POPULATION AND EMPLOYMENT DISTRIBUTION BY MUNICIPALITY

MUNICIPALITY	POPULATION			EMPLOYMENT			
	1961	1971	AVERAGE GROWTH RATE PER YEAR (1961-1971)	2001	AVERAGE GROWTH RATE PER YEAR (1971-2001)	1971	2001
Flamborough	18,200	21,000	1.5%	26,000	0.8%*	3,400	6,500
Dundas	12,900	18,600	4.4%	25,000	1.1%*	4,600	6,600
Ancaster	13,340	15,200	1.4%	23,000	1.7%*	2,000	7,400
Glanbrook	7,270	9,900	3.6%	14,600	1.6%	1,500	7,000
Stoney Creek	22,470	27,400	2.2%	75,400	5.8%	6,900	29,000
Hamilton	274,000	309,200	1.3%	386,000	0.8%	138,500	233,500
REGION	348,180	401,300	1.5%	550,000	1.2%	156,900	290,000

* Changes occurred in municipal boundaries when Regional Government was formed.

TOWN OF STONEY CREEK

POPULATION & EMPLOYMENT PROJECTIONS

	1971	2001	% Change
Population	27,400	75,400	+275
Employment	6,900	29,000	+420

These projections represent vary significant increases within the Town of Stoney Creek as compared to the other five area municipalities comprising the Region of Hamilton-Wentworth. A review of the historical population data for Stoney Creek and the population forecast for the year 2001 indicates that the average annual growth rate is expected to increase from a growth rate of 2.3% per year over the last 10 years to 4.3% per year over the next 10 years.

TRAVEL FORECASTS

Basically, the methodology utilized in assessing travel demands across the escarpment in the Town of Stoney Creek was to compare the present roadway capacity of the four accesses, Fifty Road, McNeilly Road, DeWitt Road and New Mountain Road, with the 1980 observed volumes as well as the 1990 and 2001 predicted volumes, taking into account some diversion from Highway 20. The intermediate time frame to 1990 was considered necessary in the assessment as no significant increase in the capacity of the escarpment screenlines 16 and 17 (Plate 2) is contemplated until such time as the North-South Facility is constructed, which may take up to 10 years to implement.

The approach used to develop the 1990 and 2001 travel forecasts was developed in consultation with the Regional Planning and Engineering Departments and was based on utilizing the most up to date information available as of June 1980.

The first step in travel forecasting was to identify the internal traffic zones (Plate 3) contributing to travel movement across the escarpment screenline in the Town of Stoney Creek. These were zones 10, 11, 12, 13 and 30 above the escarpment and zones 14, 15 and 23 below the escarpment. Next, the population levels within these internal zones were summarized as follows:

TABLE 3
INTERNAL ZONE POPULATIONS

ZONE	YEAR		
	1978	1990 (1)	2001 (2)
10	5,661	5,661	5,000
11	4,263	4,430	9,600
12	2,387	2,387	2,000
13	4,447	9,100	30,500
14	4,815	7,000	7,900
15	21,273	31,000	35,000
23	32,582	34,600	35,800
30	4,712	4,750	5,500

- (1) Interpolated from the Regional Population Growth Curves (1979-2001) developed by the Regional Planning Division.
- (2) Allocated population by zone as determined by the Regional Planning Division in the preparation of the Region's Official Plan.

Using the trip data from the traffic forecasting model (Table 901) the year 2001 peak hour forecasts for two-way internal movements were summarized as follows:

TABLE 4
YEAR 2001 PEAK HOUR FORECASTS (INTERNAL)

ZONES	VEHICLE TRIPS (Southbound)	ZONES	VEHICLE TRIPS (Northbound)
10-14	13	14-10	12
10-15 (50%)	44	15-10 (50%)	16
11-14	10	14-11	44
11-15 (50%)	24	15-11 (50%)	43
12-14	23	14-12	35
12-15	57	15-12	42
12-23	45	23-12	40
13-14	31	14-13	144
13-15 (50%)	100	15-13 (50%)	156
30-14	<u>12</u>	14-30	<u>15</u>
	359		547
Rounded to	360		550



LEGEND

— ZONAL BOUNDARIES



INTERNAL MACRO
TRAFFIC ZONES

Planning & Development Department
Hamilton - Wentworth Region

The 1990 peak hour forecasts for two-way internal movements were developed by factoring the year 2000 travel forecasts in direct proportion to the 1990 vs 2001 population level within each zone. This information is summarized as follows:

TABLE 5
YEAR 1990 ESTIMATED PEAK HOUR FORECASTS (INTERNAL)

Zones	2001 Vehicle Trips (1) (Two-Way Peak Hour)	Approximate Population Growth of Zone by 1990	1990 Vehicle Trips (Peak Hour)	
			SB	NB
10-14	25	98%	12	13
10-15	60	92%	15	40
11-14	54	65%	28	7
11-15	67	79%	34	19
12-14	58	95%	33	22
12-15	99	90%	38	51
12-23	85	98%	39	44
13-14	176	37%	53	12
13-15	256	61%	95	61
30-14	27	88%	<u>13</u>	<u>11</u>
Totals			360	280

(1) From Table 4

Finally, using the origin/destination trip table, external vehicle movements from external zone 34 (Plate 4) to internal zones 14, 15, 20, 22 and 23 were assigned to Screenline 17 as follows:

TABLE 6
PEAK HOUR FORECASTS (EXTERNAL)

YEAR	VEHICLE TRIPS (Peak Hour)		
	SB	NB	Total
1990 (1)	270	50	320
2001	550	100	650

- (1) Assumes 50% reduction in total 2001 external trip interchanges and 100% of zone 34 trips assigned to Screenline 17.

SCREENLINE ANALYSIS

Capacity calculations for the four access roadways crossing Screenline 17, based on surface widths of 6.5 metres, shoulder widths of 1 metre and gradients in excess of 15%, indicate that the peak hour capacity of the screenline is approximately 1200 southbound and 900 northbound. The difference is accounted for by the fact that DeWitt Road is restricted to one-way travel southbound only.

In the course of the previous planning study of the Fruitland Road Extension, it was recognized that the Highway 20 crossing of the escarpment was close to being at capacity. Comparing present observed volumes with calculated capacity, it is apparent that this roadway in 1980 is presently close to and often at theoretical capacity particularly on Fridays during the p.m. peak hour. Assuming traffic on Highway 20 will increase in direct proportion to population increases in the Region (50% increase from 1980 to 1990), it is reasonable to predict some diversion of the Highway 20 traffic easterly to Screenline 17, possibly as high as a 50% diversion.

The peak hour volumes summarized in Table 6 provide the basis for assessing the adequacy of the four access roadways from the point of view of travel demand over the planning period.

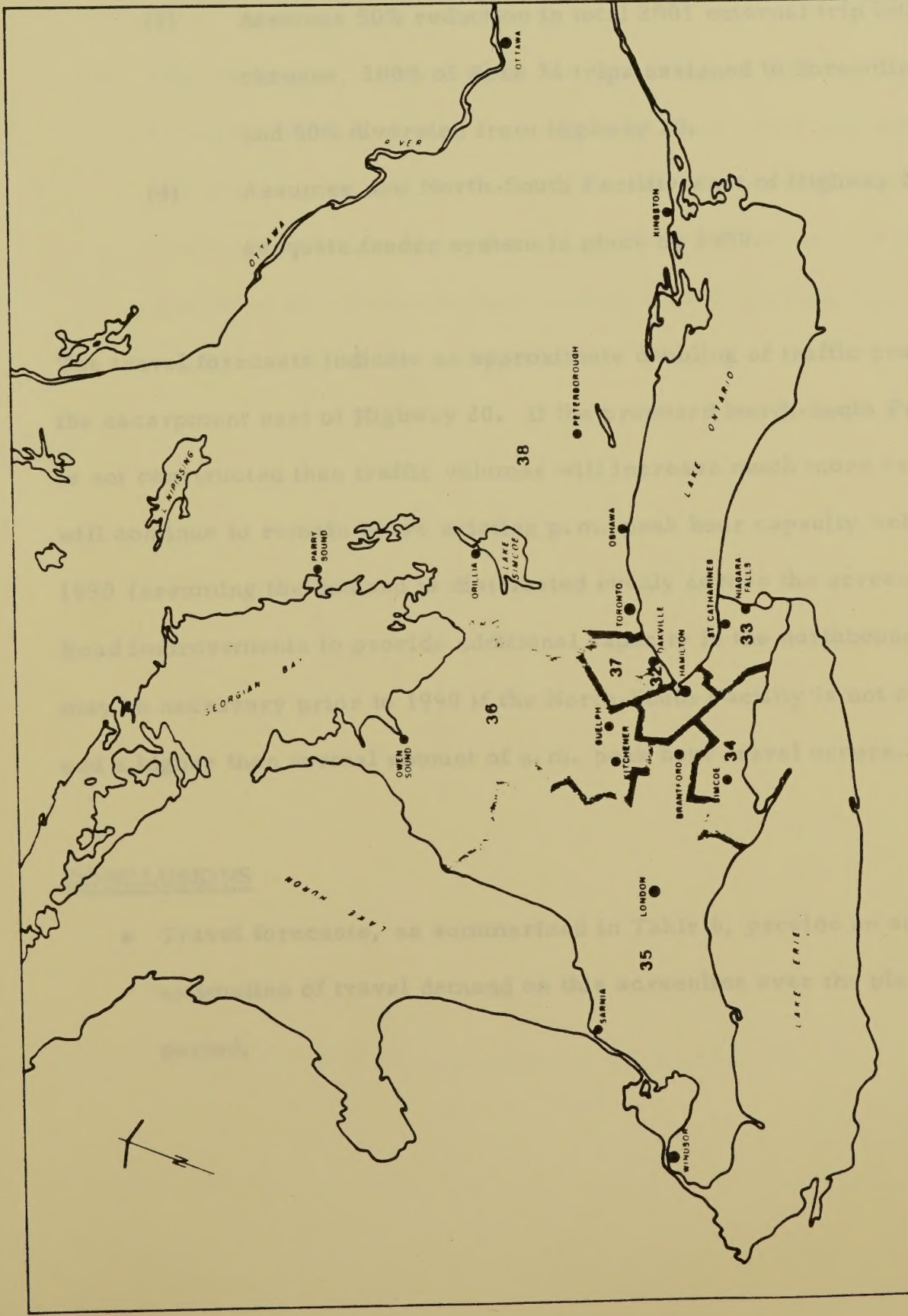
TABLE 6
ANALYSIS OF SCREENLINE 17

Year	Classification	Vehicle Trips (Peak Hour)			% Change from 1980
		SB	NB	Total	
1980 (1)		540	240	780	
1990 (2)	Internal	360	280	640	
	External	270	50	320	
	Total	630	330	960	+ 24%
1990 (3)	Internal	360	280	640	
	External	270	50	320	
	Diversion	410	80	490	
	Total	1040	410	1450	+ 87%
2001 (4)	Internal	360	550	910	
	External	550	100	650	
	Total	910	650	1560	+102%
Capacity		1200	900	2100	

LEGEND

— ZONAL BOUNDARIES

- - - - - LOCATION OF INTERNATIONAL MACRO TRAFFIC ZONES



EXTERNAL MACRO TRAFFIC ZONES

Planning & Development Department
Hamilton - Westworth Region

- (1) Measured peak hour volumes.
- (2) Assumes 50% reduction in total 2001 external trip interchanges, 100% of Zone 34 trips assigned to Screenline 17 and no diversion from Highway 20.
- (3) Assumes 50% reduction in total 2001 external trip interchanges, 100% of Zone 34 trips assigned to Screenline 17 and 50% diversion from Highway 20.
- (4) Assumes new North-South Facility west of Highway 20 with adequate feeder system in place by 1990.

The travel forecasts indicate an approximate doubling of traffic crossing the escarpment east of Highway 20. If the proposed North-South Facility is not constructed then traffic volumes will increase much more rapidly but will continue to remain below existing p.m. peak hour capacity well beyond 1990 (assuming the demand is distributed evenly across the screenline). Road improvements to provide additional capacity in the northbound direction may be necessary prior to 1990 if the North-South Facility is not constructed and a higher than normal amount of a.m. peak hour travel occurs.

CONCLUSIONS

- Travel forecasts, as summarized in Table 6, provide an adequate estimation of travel demand on this screenline over the planning period.

- The travel forecasts, when viewed in isolation, do not indicate the need for the construction of the Fruitland Road Extension, assuming an adequate distribution to specific roads across the screenline is maintained and the demand is distributed evenly across the screenline.
- The analysis of the screenline level of detail is not sensitive to localized impacts of traffic growth. An assignment of traffic to each link crossing the escarpment on Screenline 17 would help to identify roads where potential congestion problems may occur. If traffic growth on New Mountain Road continues at its present rate, it will reach capacity by the mid 1980's.

ALTERNATIVES

PRELIMINARY ASSESSMENT

In order to investigate the merits of improving the existing roadways, it was necessary first to carry out a preliminary assessment of the roadways. This assessment was carried out in order to identify the main problems and to establish the relative importance of the various problems. The assessment was carried out by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering. The assessment was carried out in order to identify the main problems and to establish the relative importance of the various problems. The assessment was carried out by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering.

Following the completion of the preliminary assessment, it was necessary to carry out a detailed assessment of the roadways. This assessment was carried out in order to identify the main problems and to establish the relative importance of the various problems. The assessment was carried out by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering. The assessment was carried out in order to identify the main problems and to establish the relative importance of the various problems. The assessment was carried out by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering.

DESIGN CRITERIA

In carrying out the design of the roadways, it was necessary to establish the design criteria. The design criteria were established in order to ensure that the roadways were designed to meet the requirements of the traffic. The design criteria were established by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering. The design criteria were established in order to ensure that the roadways were designed to meet the requirements of the traffic. The design criteria were established by a team of experts in the field of road engineering and by a team of experts in the field of traffic engineering.

ALTERNATIVES

ALTERNATIVES

PRELIMINARY ASSESSMENT

In order to investigate the merits of upgrading the existing access roadways, it was necessary first to carry out a preliminary assessment of the four roadways from the point of view of what improvements might be practical and second to identify minimum standards to be utilized in the development of alternatives.

Following the review of the existing alignment and grade of each access roadway, it was quite apparent that any improvements to these roadways would have to be restricted to easing the horizontal alignment to 20 metres in the 'switch-back' locations and to widening the roadways. The grades were found to be so steep that any attempt to flatten the grades to conform to the minimum standard of 12% for this class of roadway would result in the total realignment of the access roadways and this was considered to be unacceptable.

DESIGN CRITERIA

Recognizing the limitations imposed by the present alignment and cross section, it was agreed that any work associated with reconstruction of the existing access roadways, Fifty Road, McNeilly Road, DeWitt Road and New Mountain Road, should conform to the geometric standards summarized in Table 7.

TABLE 7

RECOMMENDED GEOMETRIC STANDARDS
FOR UPGRADING EXISTING ACCESS ROADWAYS

	'A' STANDARDS (Without Fruitland Road Extension)	'B' STANDARDS (With Fruitland Road Extension)
Classification	UCU	RCU
Design Speed	25 kph	25 kph
Curvature	20 m (1)	20 m (1)
Gradient	12.20%	12.20%
Stopping Sight Distance Min.	45 m	45 m
Equivalent Vertical Curve (crest)	K = 4	K = 4
Equivalent Vertical Curve (Sag)	K = 8	K = 8
Pavement Width	8.5 m	7.3 m
Shoulder Width	0.6/2.5 m (2)	1.0 m
Right-of-Way Width	30 m	30 m

(1) minimum radius based on maximum superelevation rate of
0.08 m/m

(2) uphill shoulder width/downhill shoulder width

The 'A' standard proposes the reconstruction of the present access roadways utilizing curb and gutter with a 2.0 metre climbing lane adjacent to the 8.5 metre pavement section. Alternately, the 'B' standard would eliminate the climbing lane and curb and gutter excepting for the uphill widening in rock cut.

Following the identification of geometric standards, a series of typical cross sections was developed for each of the two standards covering the range of types of construction that would be encountered in reconstructing each access roadway.

UPGRADING EXISTING ACCESSES

Initially it had been planned to make use of the existing topographic mapping, 1" = 40' on Fifty Road and 1" = 200' on the other access roadways, however, the accuracy of any investigations using the 1" = 200' topographic mapping was found to be far too unreliable. Furthermore, the time and budget allocated to the study did not facilitate obtaining additional topographic mapping at a larger scale. Consequently, the approach utilized in carrying out the necessary feasibility studies was as follows:

- 1) develop and prepare unit construction costs for 6 typical cross sections on Fifty Road over the escarpment section utilizing the 1" = 40' topographic mapping augmented by field cross sections.
- 2) develop and prepare unit construction costs for 5 typical cross sections on DeWitt Road over the section between the THBR crossing and Ridge Road utilizing field cross sections supplied by the Town of Stoney Creek.
- 3) subdivide each roadway into lengths representing the type of construction that would likely be encountered in upgrading each route.
- 4) develop preliminary cost estimates for upgrading each access roadway utilizing the unit construction costs for various types of construction.

In carrying out the investigations associated with upgrading Fifty Road between Highway 8 and Ridge Road, the following conclusions were reached:

- Realignment in the vicinity of the top of the escarpment is predicated on providing a consistent minimum curvature of 50 metres over the entire route.
- Reconstruction over sidehill sections would best be achieved by widening in total either uphill or downhill. The partial uphill and downhill widening approach would involve additional costs.
- Reconstruction involving earth grading would best be achieved by widening uphill. Alternately widening downhill although less costly would denude the downhill slope of vegetation. This approach has been assumed in developing costs for the reconstruction of the other access roads where widening in earth would be required.
- Reconstruction over the uphill section could best be achieved by widening uphill using a steel faced rock section. Alternately widening downhill using a tie back retaining wall system was found to be roughly the same cost, however, the geotechnical information gathered to date is too limited to be confident of the evaluation of the depth to rock at the outside edge of the widened section. Further geotechnical investigations at the preliminary engineering stage could be considered in order to properly evaluate the merits of uphill vs downhill widening in rock cut/talus sections of the escarpment particularly along the upper sections of Fifty Road and McNeilly Road. Widening

downhill would probably be more advantageous from the point of view of being able to maintain existing traffic during reconstruction.

- With careful attention, reconstruction of Fifty Road to either standard could be carried out without serious social or environmental impacts.

In carrying out the investigations associated with upgrading McNeilly Road between Highway 8 and Ridge Road, the following conclusions were reached:

- Realignment at the top of the escarpment is predicated on providing a consistent minimum curvature of 20 metres over the entire route. In this regard, the alignment constraint is the 'switch-back' halfway up the escarpment. Alternately at the top, the roadway could be realigned to the west of the 'parkette', although this improvement would involve the purchase of more farmland.
- Reconstruction over the entire route would best be achieved by widening uphill although the downhill option might be considered, at the preliminary design stage, over the upper section depending on the depth to rock at the outside edge of the shoulder. In no case should widening on earth or rock fill be considered as this type of construction would result in unnecessary environmental impacts.

In carrying out the investigations associated with upgrading DeWitt Road between Hilts Lane and Ridge Road, the following conclusions were reached:

- The present condition of the roadway over the upper section warrants immediate attention in regards to scaling back the existing rock face in order to minimize the possibility of falling rock contributing to an accident.

- Reconstruction between Hilts Lane and Ridge Road could only be achieved by widening uphill using a steel faced rock section. Initially, some consideration was given to widening downhill, however, Golder Associates has determined that the minimum downhill slope for stability would be in the order of 1.5 to 1 which could not be accommodated between the THBR tracks and the upper section of DeWitt Road.
- Ridge Road should be realigned southerly in order to provide an adequate intersection with DeWitt Road at the top of the escarpment. The actual alignment would be subject to negotiations with the affected property owners.

In carrying out the investigations associated with upgrading New Mountain Road between King Street and Ridge Road, the following conclusions were reached:

- The present subway structure at the THBR is rated as being deficient due to restricted clearances and furthermore the south approach to the structure is in need of improvement, consequently, any upgrading of New Mountain Road to minimum standards should include the construction of a new subway immediately to the west of the present structure.
- Reconstruction between the THBR and Ridge Road could only be achieved by widening uphill using a steel faced rock section. The present roadway was constructed partially on a downhill rock fill and it is considered inadvisable to widen this fill further.

- Ridge Road should be realigned in conjunction with improvements to New Mountain Road in order to provide an adequate intersection between the two roadways at the top of the escarpment. The actual alignment would be subject to negotiations with the affected property owners.

To this point in the investigation of alternatives, two basic standards were considered for upgrading the four access roadways. It was recognized that a third standard (referred to as Standard 'C') which would involve remedial work only on each of the existing accesses, might also be considered. This approach would include such work as ditching, replacement of culverts and guiderail as required and pavement resurfacing, etc.

Preliminary cost estimates for upgrading each of the four escarpment access roads are summarized in the following table.

TABLE 8

SUMMARY OF PRELIMINARY CONSTRUCTION COST ESTIMATES
(MILLIONS OF DOLLARS)

	'A' STANDARD Reconstruction Urban Section with Climbing Lane (No Fruitland Road Extension)	'B' STANDARD Reconstruction Rural Section Without Climbing Lane (With Fruitland Road Extension)	'C' STANDARD Remedial Work Only (With Fruitland Road Extension)
Fifty Road	1.50	0.95	0.15
McNeilly Road	1.35	0.85	0.10
DeWitt Road	1.25	closed	closed
New Mountain Road	1.70	1.30	0.15
TOTALS	5.80	3.10	0.40

FRUITLAND ROAD ACCESS

The extension of Fruitland Road from Highway 8 southerly to the Tapleystown Road above the Niagara Escarpment was studied in detail by the former Hamilton-Wentworth Suburban Roads Commission and these investigations were documented in a functional planning report prepared by McCormick, Rankin & Associates Limited. The study concluded that the extension of this roadway across the escarpment was essential to the residential and industrial growth in the Town of Stoney Creek and was physically feasible at a reasonable cost (2.0 million dollars in 1969, including an allowance of \$460,000 for property acquisition).

More recently, the Region of Hamilton-Wentworth Engineering Department studied an alternate alignment for Fruitland Road between the Queen Elizabeth Way and Highway 8 and concluded that such an alignment offset to the east of the present Fruitland Road was preferable to the use of the present alignment. This latter investigation reconfirmed the feasibility of the earlier alignment proposal south of Highway 8.

Using the estimated quantities summarized in Table 9.1 of the previous functional planning report and up-to-date unit prices for the various items of work, an updated cost for the extension of Fruitland Road south of Highway 8 was developed.

The total cost of constructing Fruitland Road as a two lane facility with a climbing lane between Highway 8 and the Tapleystown Road south of Ridge Road, including an overhead structure at the crossing of the THBR, is 4.0 million dollars (excluding property). The additional cost to expand the roadway to four lanes with a climbing lane, in the future, would be 2.9 million dollars.

Alternately, the cost of tunneling the escarpment on the Line 'C' alignment previously identified at 5.0 million dollars has escalated to approximately 7.5 million dollars in 1980.

CONCLUSIONS

The following table summarizes the comparative costs of upgrading the existing access roads, Fifty Road, McNeilly Road, DeWitt Road and New Mountain Road vs constructing the Fruitland Road Extension in conjunction with either remedial work only or a reduced upgrading standard.

TABLE 9

SUMMARY OF PRELIMINARY CONSTRUCTION COST ESTIMATES
ALL FACILITIES
(MILLIONS OF DOLLARS)

	'A' STANDARD Reconstruction Urban Section with Climbing Lane (No Fruitland Road Extension)	'B' STANDARD Reconstruction Rural Section Without Climbing Lane (With Fruitland Road Extension)	'C' STANDARD Remedial Work Only (With Fruitland Road Extension)
Fifty Road	1.50	0.95	0.15
McNeilly Road	1.35	0.85	0.10
Fruitland Road	-	4.00	4.00
DeWitt Road	1.25	closed	closed
New Mountain Road	1.70	1.30	0.15
TOTALS	5.80	7.10	4.40

SUMMARY

Summary

Referring to the summary of the analysis of Section 17, Table 1, page 11, it is apparent that the volume of traffic is expected to increase appreciably over the planning period and probably to a greater degree over the next 10 years, assuming no change in the North-South Freeway until approximately 1970 and significant diversion of traffic from Highway 16. The summary of peak hour volume indicates that the capacity of the freeway will be exceeded at the anticipated peak demand, however, it is also quite apparent that certain facilities such as New Mountain Road are likely to experience congestion problems as early as the mid 1960's. It is also important to realize that any upgrading of the existing access will not result in any significant increase in the capacity of the freeway as the widening of 72 to 100 ft would not be improved. Alternatively, widening the Freeway to 100 ft and adding a new lane would increase the capacity of the freeway to 100 ft and a climbing lane would increase the capacity of the freeway to 100 ft. This would relieve the pressure on the other access as well as providing an alternate access across the freeway.

The preliminary investigation has confirmed that each of the existing accesses is experiencing varying degrees of congestion due to slope creep. The active slope creeps on any of the four accesses were noted at the time of the field investigation, however, there is always the possibility of sudden changes in embankment stability, particularly in the spring when groundwater conditions are high. The following is a summary of the findings of the investigation.

SUMMARY

SUMMARY

Referring to the summary of the analysis of Screenline 17, Table 6, page 15, it is apparent that the travel demand across the screenline will increase appreciably over the planning period and probably to a greater degree over the next 10 years, assuming no completion of the North-South Facility until approximately 1990 and significant diversion of traffic from Highway 20.

The summary of peak hour volumes indicates that the capacity of the screenline can meet the anticipated travel demand, however, it is also quite apparent that certain facilities such as New Mountain Road are likely to experience congestion problems as early as the mid 1980's. It is also important to realize that any upgrading of the existing access will not result in any appreciable increase in the capacity of the screenline as the existing grades of 12 to 20% would not be improved. Alternately, constructing the Fruitland Road Extension as a two lane access with a maximum gradient of 7% and a climbing lane would approximately double the capacity of the escarpment screenline, thus relieving the pressure on the other accesses as well as providing an alternate access across the escarpment.

The geotechnical investigation has confirmed that each of the existing accesses is experiencing varying degrees of downhill movement due to slope creep. No active slope instabilities on any of the four accesses were noted at the time of the field investigations, however, there is always the possibility of sudden changes in embankment stability, particularly in the spring when groundwater conditions are worst. The obvious concern in this regard is the necessity to

maintain traffic on DeWitt Road over the planning period or until such time as a new access is constructed in order to provide sufficient capacity across the screenline.

From Table 9, it can also be concluded that the cost of constructing a completely new access together with remedial work on the existing accesses (4.40 million dollars) is considerably less than the cost of upgrading the existing accesses to what can be regarded as minimum standards (5.80 million dollars).

In summary, construction of the Fruitland Road Extension between Highway 8 and the Tapleytown Road south of Ridge Road would best meet the Region's and the Town's objectives of improving the escarpment accessibility in the Town of Stoney Creek, taking into consideration the economic, social and environmental implications.

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